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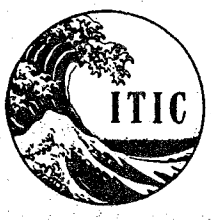

INTERNATIONAL
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INTERGOVERNMENTAL
OCEANOGRAPHIC
COMMISSION - UNESCO

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Dr. George Pararas-Carayannis
Director

TSUNAMI NEWSLETTER is published by the International Tsunami Information Center to bring news and information to scientists, engineers, educators, community protection agencies and governments throughout the world.

We welcome contributions from our readers.

The International Tsunami Information Center is maintained by the U.S. National Oceanic and Atmospheric Administration for the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization. The Center's mission is to mitigate the effects of tsunamis throughout the Pacific.

MEMBER STATES

Present membership of the International Coordination Group for the Tsunami Warning System in the Pacific comprises of the following States:

CANADA
CHILE
CHINA
COOK ISLANDS
ECUADOR
FIJI
FRANCE
GUATEMALA
INDONESIA
JAPAN
KOREA (REPUBLIC OF)
MEXICO
NEW ZEALAND
PERU
PHILIPPINES
SINGAPORE
THAILAND
UNITED KINGDOM (HONG KONG)
USA
USSR
WESTERN SAMOA

NEWS EVENTS

Mt. St. Helens Volcano

After a week of local seismicity, Mt. St. Helens first erupted on March 27, 1980. During the first 10 days of the eruption, pulses of steam and ash rose as much as 3 km above the summit. Ashfalls occurred from Northeast to Southeast of the volcano and as far away as Spokane, Washington (about 500 km to the Northeast) and Bend, Oregon (250 km to the South).

By April 8, the two initially separate active vents had coalesced into a single crater, at least 500 meters long by 350 meters wide; and deepened to 300 meters by April 12. Most mid-April eruption clouds were small and consisted primarily of vapor, but ash-rich clouds were occasionally ejected to 1 km or more above the summit. Large ice blocks were sometimes included in the ejecta. Slight episodes of deformation have been recorded. Another ejection of ash occurred on April 22. No fresh magma has been identified in any of the ejecta. Episodic explosions were replaced by continuous steaming, which was continued in early May. The volcano exploded with cataclysmic force May 18 leaving 64 people either dead or missing. Four consecutive eruptions occurred on July 22, blowing out the lava dome in St. Helen's crater floor and sending gray mushroom clouds of ash more than 10 miles into the sky. The ash cloud spread over central and northeast Washington State and it was visible as far north as Seattle, 100 miles away. A series of small shallow earthquakes preceeded the 22 July eruptions.

Ephemeral Island (10.8°N, 75.4°W)

An island 30 meter long, 5 meter wide and 7 meter high was formed during the night of December 12, 1979 in the Caribbean Sea, 300 meters off the coast of Punta Canoa, Colombia. The sawtoothed island was composed to greenish-gray clay, apparently squeezed upward through a fissure. By December 29, the island was only half its initial size and disappeared under the pounding of strong waves on January 9, 1980.

The Caribbean coast of Colombia is well-known for its mud volcanoes, which have "eruptions" driven by petroleum gases. (SEAN Bulletin, Vol. 5, No. 2, Feb. 29, 1980)

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FEATURES

The following is a news release of the Geological survey of the Department of the Interior, reprinted from AGID News, Official Newsletter of the Association of Geoscientist for International Development, No. 21, October 1979.

Seismic Gaps and Earthquake Prediction

[Editor's Note: Earthquakes are catastrophic. Precautions could be taken to avoid great losses to people and properties if future occurrences could be predicted. This news release of the Department of the Interior gives the necessary clues.]

WHAT IS A SEISMIC GAP? According to the theory of plate tectonics, the Earth's outer shell, including the crust and upper mantle, is composed of a number of large semi-rigid plates that are in constant slow motion. Most of the world's earthquakes occur where the plates slide against each other along vertical "transform faults," or where one slides over another along a dipping "subduction zone." The term "seismic gap" refers to regions along these active plate boundaries where: 1) large earthquakes have occurred in the past, but not within the past 30 years; and 2) nearby parts of plate boundaries either have experienced strain-releasing major earthquakes within the past 30 years or have no history of past great earthquakes (suggesting that strain has been released by aseismic creep or by small to moderate earthquakes). A seismic gap might be considered as a quiet zone where strain, that must eventually be released, has been building up in an area that has a history of releasing such strain through large earthquakes.

WHAT IS THE IMPORTANCE OF IDENTIFYING A SEISMIC GAP? The identification of a seismic gap is not sufficient in itself to provide a "hard" prediction of an earthquake; however, the identification indicates where a large earthquake may be due, and is an important step towards developing a capability for earthquake prediction. According to some scientists from the Soviet Union, Japan, and the United States, the seismic gap theory has led to the successful forecast of the locations of at least six major earthquakes in different parts of the world in recent years.

It is also important to note that some "seismic gaps" are relatively "permanent," because large shocks have occurred in these zones infrequently or not at all during recorded history. Until we understand why large shocks do not occur along some parts of plate boundaries, it is not possible to accurately forecast whether some areas that have been aseismic for the last 100 to 300 years will remain quiescent in the future.

HAVE MANY SEISMIC GAPS BEEN IDENTIFIED? More than 10 gaps have been identified where the last great earthquakes occurred more than 100 years ago. Many more gaps have been identified where great earthquakes have occurred more than 30 years ago but less than 100 years ago. The identified gaps occur along the plate boundaries that surround the Pacific Ocean (and the Caribbean Sea): one on the west-central coast of South America; a cluster of three in the eastern Caribbean and north-central South America; two in California; three in southern Alaska; one in Japan; one north of Taiwan; and two in the South Pacific.

WHERE ARE THE SEISMIC GAPS IN THE U.S.? Seismic gaps have been identified in California and Alaska. In California, two segments of the San Andreas fault are considered to be seismic gaps. One is northeast of Los Angeles and the other is near San Francisco. The intervening segment of the fault is characterized by aseismic creep and is therefore believed to be less

likely to produce a large earthquake than the other two segments. In Alaska, one gap occurs just north of Cape Yakataga, in the area bordering the northeastern Gulf of Alaska; another lies just south of the western end of the Alaska Peninsula; and a third is at the extreme western end of the Aleutian Island chain.

WHY IS THE YAKATAGA GAP SUSPECTED? The Yakataga seismic gap is in south-central Alaska centered on the coast of the Gulf of Alaska about 150 miles southeast of Valdez. The gap area is about 100 miles wide and about 150 miles long, extending from Icy Bay to Kayak Island. The coastal Alaska region near Cape Yakataga includes one relatively quiet segment of an active plate boundary thrust zone where two large plates of the Earth's crust -- the Pacific and North American plates -- are converging at a rate of about 2 inches per year. As the Pacific plate slides slowly northward under the North American plate, an enormous amount of elastic strain is built up within the plates. To the west and east of the Yakataga gap, this strain has been released by major earthquakes in 1964 and 1958, respectively, while within the gap, the last earthquake of similar size occurred in 1899. (The February 1979 earthquake, with a magnitude of 7.7, released strain only in a small region on the east margin of the gap.) As a result of the plate movement, as much as 16 feet of elastic strain could have accumulated in the past 80 years.

WHEN CAN A LARGE QUAKE BE EXPECTED IN THE YAKATAGA GAP REGION? At this time, no one can predict when the next large earthquake will occur within this gap. Most scientists agree, however, that a large earthquake could occur anytime and is likely within the next two four decades. It appears unlikely that the region could escape a large earthquake for as long as 100 years.

HOW BIG COULD SUCH AN EARTHQUAKE BE? Enough strain appears to have accumulated to generate an earthquake with a Richter Scale magnitude of 8 or more. Such a great earthquake could produce potentially damaging ground motion over an area as large as 30,000 square miles.

IS A LARGE EARTHQUAKE THERE INEVITABLE WITHIN THE NEXT FEW DECADES? No. While the strain building up on the Yakataga seismic gap must inevitably be released, and most likely by a large earthquake, there are other possibilities. For example, a significant part of the strain might be relieved through processes such as slow fault "creep" or rock folding without earthquakes. Another possibility might be for strain to continue to accumulate for another century or more to the threshold of an extremely large earthquake, similar in size (8.3) to the 1964 Good Friday earthquake in the Anchorage area. Finally, strains throughout the region must be released more gradually through a sequence of earthquakes less than magnitude 8 but more similar to the magnitude 7.7 St. Elias earthquake of February 1979 in the eastern part of the Yakataga gap.

WHAT ARE SCIENTISTS DOING ABOUT THE YAKATAGA AND OTHER SEISMIC GAP AREAS IN THE U.S.? In the Yakataga gap region, ongoing studies will be intensified and expanded, including seismograph, strainmeter, and tiltmeter networks, strong-motion monitoring stations, geodetic leveling and trilateration, and detailed geologic investigations of faults and coastal landforms. Under-water precision bathymetric and subbottom acoustic profiling

may also be used in the nearby parts of the Gulf of Alaska.

In southern and central California, where sensitive instruments have been deployed and ongoing investigations have been intensified in recent years, monitoring and analysis will continue. Such monitoring is expected to develop a more detailed understanding of the potential for large earthquakes and to observe the processes leading up to them. A large part of the studies will continue to be carried out under contracts and grants with universities and other institutions through the U.S. Geological Survey Earthquake Hazards Reduction Program.

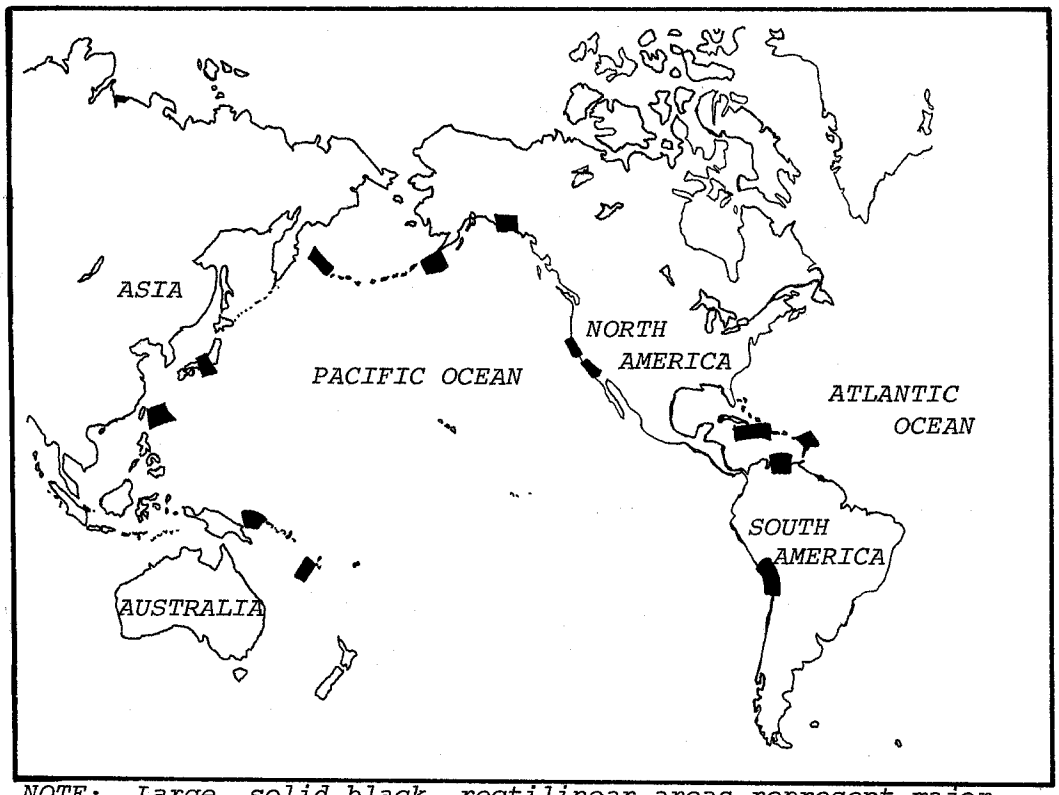
WHAT CAN PEOPLE DO WHO LIVE IN SEISMIC GAP AREAS? The inhabitants of any area having a history of strong earthquakes should expect another at any time and should plan ahead to minimize the risk to their lives and property. There are many actions individuals can take to reduce the dangers from earthquakes to themselves and their families, such as:

* Citizen support for safe building codes and regulations that provide for efficient inspection and firm enforcement, for strengthening or replacing old weak buildings with modern earthquake-resistant structures, and for planning responses to anticipated damaging effects.

* Resident checks to eliminate earthquake hazards from falling objects and from utility connections where rupture could cause fire to break out.

* Individual planning that can help people to act calmly and constructively in an emergency: think about what you should do if an earthquake strikes when you are at home, driving your car, at work, in a public building, or while involved in other regular activities.

There are no rules which can eliminate all earthquake danger. Damage and injury can be greatly reduced, however, by learning how earthquakes could affect the land in your region and the structures on it, and by applying a little common sense in forethought. (See map).



NOTE: Large, solid black, rectilinear areas represent major seismic gaps of the world.

UNESCO - IOC - ITSU

Second Session of the Joint IOC/IMCO Group of Experts on Private Law Aspects of Ocean Data Acquisition Systems, Aids and Devices (ODAS)

The Summary report of the second session of the Joint IOC/IMCO Group of Experts on Private Law Aspects of Ocean Data Acquisition Systems, Aids and Devices (ODAS) held at Inter-Governmental Maritime Consultative Organization of UN (IMCO) Headquarters in London from 5 to 7 December 1979, has been completed. Copies have been distributed to Member States of IOC and IMCO for comments and recommendations on the revised draft Articles. It is expected that the revised draft Articles, together with a summary of comments received from Member States, will in due course be placed before the Legal Committee of IMCO, for its consideration and observations.

Twelfth Session of the Executive Council of IOC

Summary report of the above mentioned session held from 22 to 24 October 1979 at Unesco House in Paris is now available. During the session, the Council discussed recommendations of the Working Group of the Future Role and Functions of the Commission and approved four draft resolutions for submission to the Assembly for consideration.

Revised Edition of Part II of the IOC Manual

The purpose of IOC Manual is to provide all persons concerned with the work of IOC with a handy reference document giving full details of the structure and workings of the Commission and its Secretariat. Part II of this manual containing matters of a more transitory nature has been updated and published. Copies of the IOC Manual - Part II can be obtained from the IOC Secretariat.

Summary Report of the Seventh Session of ITSU held in Chile

The following is a partial summary report of the Seventh Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific held from 3 to 7 March 1980 in Viña del Mar, Chile.

1. Opening of the Session

The Seventh Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG-ITSU) was convened at Hotel Miramar in Vina del Mar, Chile, on Monday, 3 March 1980, at 10.00.

The Instituto Hidrográfico de la Armada de Chile served as host for the meeting, and made arrangements for logistical support.

The Chairman of the Group, Mr. G.C. Dohler, welcomed the participants and introduced the speakers. The welcome speech was given by the Director of the Hydrographic Institute of the Navy and Head of the Chilean Delegation, Capitán de Navío Mariano A. Sepúlveda (Annex V). The Chairman, on behalf of the Group, thanked the Chilean authorities for their kind invitation to hold the meeting in Viña del Mar.

Dr. Günter Giermann, Deputy Secretary of the Commission and representative of Unesco, welcomed the Group in the name of the Director General of Unesco and the Secretary of IOC, and thanked the Government of Chile for hosting the meeting and providing such fine facilities.

The official opening address was given by the Commander in Chief of the Navy and Member of the Honourable Government Junta, First Admiral José Toribio Merino Castro.

Representatives of the following Member States attended the session: Canada, Chile, Ecuador, Fiji, France, Indonesia, Peru and USA. WMO was also represented (see Annex IV, List of Participants).

2. Adoption of the Agenda and Election of the Rapporteur

The Group adopted the Agenda (Annex I). Mr. Sydney O. Wigen, delegate of Canada, was elected rapporteur. The Chairman, Mr. G.C. Dohler, outlined the activities of the Group during the intersessional period (Annex III).

3. *State of implementation of resolution EC-X.14 and of recommendations from the Sixth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific (Manila, 20-25 February 1978)*

In resolution EC-X.14, the Executive Council approved the report and the recommendations of the Sixth Session, urged Member States to accelerate the preparation and widest dissemination of tsunami educational material for the general public, and instructed the Secretary to investigate means of obtaining additional financial support for the preparation and dissemination of such material.

The Secretary reported on the proposed activities planned for 1980 to be funded through the Unesco Regular Budget. These activities include:

- *The Meeting of the Seventh Session of the ICG/ITSU,*
- *Visits of the Director and Associate Director ITIC to Member States,*
- *Post-tsunami surveys by ITIC,*
- *The visiting scientists programme to ITIC (2 scientists for a 6-week period),*
- *The catalogue of tsunami marigrams,*
- *Narrated slides for educational purposes, and*
- *A financial contribution to the publication of the proceedings of the IUGG Tsunami Committee meeting in Canberra, December 1979.*

The total expenses in 1980 will amount to approximately US $30,000.

The Secretary further informed the Group that the Unesco financial period 1981-1982 had been extended to 1981-1983. During this period ITSU might expect to receive approximately US $50,000 annually from Unesco's Regular Budget of which training and education aspects (TEMA-ITSU) will absorb more than 50 per cent.

These funds will cover:

Funding of the Eighth Session of the ICG/ITSU; run-up surveys by ITIC, immediately after the occurrences of major tsunamis; ITIC staff travel; ITIC contractual services; publications; a Workshop; preparation and publication of educational material; a training course on technology needed for an effective warning system; visiting scientists programme.

The Secretary pointed out that because of the increasing demands extrabudgetary funds should be sought, such as from UNDP, UNEP or the Interim Fund for Science and Technology. Although members indicated that they might desire to review 1981-1983 allocations and perhaps have options of making changes in accordance with new priorities, the Secretary pointed out that allocations for 1981-1983 can only be changed through interventions at the next Unesco General Conference.

In coming to the budget for 1984-1985, which is addressed in detail in agenda item 14, the Chairman pointed out the importance of having

clearly defined action items for this forthcoming period, recalling the past very successful budgetary exercise for the 1981-1982 period.

In order to better organize the session, the Chairman called for the establishment of four ad hoc groups to study specific agenda items and to prepare draft resolutions and recommendations.

The following groups were established and their Chairmen designated:

1. *Budget 1984-1985: USA, France and Chile. Chairman: Mr. Thompson (USA)*

2. *Extra-budgetary Funding: ITIC, Chile, Peru, Ecuador; Chairman: Dr. Pararas-Carayannis (ITIC)*

3. *Education: Chile, Peru, Fiji and Indonesia; Chairman: Capt. Sepúlveda (Chile)*

4. *Associate Director - ITIC: Canada, USA, Indonesia, Chile and ITIC; Chairman: Mr. Wigen (Canada)*

4. *Activity Report by the Director, International Tsunami Information Center (ITIC)*

The Director ITIC, Dr. G. Pararas-Carayannis, presented a detailed report outlining activities of ITIC over the last 2 years. He stated that the Center had been working to meet the responsibilities designated by ITSU-VI, and to meet the requirements as set forth in the mandate of ITIC. He commended the work of the previous Associate Directors, Mr. Wigen and Mr. Ridgway, and stated that the lack of Associate Director since June 1979 has had an adverse effect. ITIC is one of the most effective units of IOC, but it is difficult for it to carry out all work with the present support. He drew attention to a number of highlights of the Center's recent activities. A Tsunami Report series is being published regularly to provide information on the tsunamis as soon as possible after their being generated. A bibliography of tsunami literature is nearing completion. Results of tsunami investigations are being computerized in order to have them accessible for decision-making at the Pacific Tsunami Warning Center. The production of time charts has been computerized and two charts have been produced in the last year. Production costs for charts are in the order of US $1,500 - 2,000. New members have been brought into ITSU, specifically Fiji, Hong Kong (UK), Singapore and Western Samoa. Visits have been made to provide liaison with Member States and to countries needed in ITSU, to foster the development of regional warning systems. A damage and disaster survey was made in Colombia after the earthquake on 12 December 1979.

The Director ITIC circulated to Member States a new ITIC publication, "A Guide for a Post-Tsunami Survey." The guide stresses the necessity of tsunami surveys as soon as possible after inundations have taken place and also the need for accuracy and reliability, since much of the direct or indirect evidence disappears with time. The report gives guidance on the conduct of a survey and the great variety of circumstances, problems to be expected and suggestions on logistics.

The recommendation that Member States participate in post-tsunami surveys was supported by the Group which adopted Recommendation 6 to that effect.

5. *National activity reports*

The representatives of the Member States reported on developments in their respective countries. Written reports were presented by the delegates of Canada, Chile, Fiji, Indonesia, Peru and USA. The delegate from Ecuador announced that his report would be distributed later. The Secretary read the national report from Japan, which was received by mail. The delegate of France informed the Group that his national report had been mailed but not received and it will also be distributed later directly to Member States. These reports are not annexed to the Summary Report, but will be made available, on request, by the Secretary IOC, Paris, or the Director ITIC, Honolulu.

Significant questions were raised relevant to several reports. The delegate of Chile informed the Group that the Chilean seismic stations are organized into 4 local networks with 8-19 stations in each.

Arrangements between Chile, Ecuador, Peru and USA are being made for the installation of 4 automated tidal stations to operate in the Tsunami Warning System using the GOES satellite.

Regarding tidal stations, the Indonesian delegate informed the Group that Indonesian gauges provide records, which are transmitted to headquarters with a certain delay, and that data are not available in real time. With reference to the alarm system, the delegate of Peru informed the Group that seismic (not tidal) records are transmitted by phone from the agency responsible for the seismic network.

The USA and the Chilean delegates emphasized the importance of close correlation of seismic and tidal information. In many countries these seem to be handled separately, and Member States are therefore invited to look for closer co-operation between their respective agencies.

In response to questions, the USA delegate informed the Group that his country will maintain its present level of support to ITIC and it would be unrealistic to expect any substantial increases at this time. In response to a question regarding the speed with which the Pacific Tsunami Warning Center (PTWC) can locate the epicentre of any earthquake, the USA delegate replied that location near the Hawaiian Islands can be established without delay by 6-8 local seismic stations. As for the rest of the Pacific, responses are received from the Alaskan Tsunami Warning Center and a few other stations and it takes about 15 minutes to gather data and locate the epicentre. 90 per cent of the initial positioning is correct within 1 degree latitude and longitude but less accuracy is experienced for earthquakes in the South East and South West Pacific. Regarding the Water Level Telemetry System, some tide stations can automatically be switched to a tsunami mode in which data can be stored at 30 second intervals for 3 hours. At present, these records are used only for tsunami determination, but the possibility of storing these data for later tsunami research is now under consideration. With regard to tidal

data platforms which can transmit via statellite, the USA has specifications on the instrumentation available: if Member States wish to obtain such equipment, the USA can supply these specifications, and the sources from which the instruments can be purchased. The Director ITIC reported that some of this information is contained in the January 1980 Newsletter.

A film "In Search of Tsunamis" was shown to the Group, which had been commercially produced. It may be possible to purchase a copy of this film from the producers.

The Canadian delegate was questioned regarding the statement in his report on studies using the SEASAT Radar Altimetry and the suggestion that tsunami data may be observable from the National Oceanic Satellite System (NOSS). It was questioned whether an orbiting satellite would provide significant data. In response, the Canadian delegate pointed out that research in progress on the satellite radar data would be directed specifically to tsunamis whenever one should occur; if it is found that the tsunami waves are detected in passes of the satellite, it may be worth considering including such instrumentation in a geostationary satellite. The date for the Bamfield tidal gauge to become instrumented for interrogation by the Geostationary Operational Environmental Satellite System (GOES) was questioned, but because of mechanical difficulties no date could be given.

6. *Decision of the IOC Assembly at its Eleventh Session on the Associate Director for ITIC (Resolution XI-23)*

The Secretary read for the meeting Resolution XI-23 referring to the problem of the vacancy in the Associate Director position at ITIC. The Director recognized the necessity of having an Associate Director in order for the work of the Center to be carried out effectively. He identified three possible solutions: (a) funding the position through the IOC budget; (b) through the IOC Trust Fund; (c) through Member States making short-term assignments, for a few months only, with IOC support for travel and subsistance. Assignees would then work on special projects. The Director made it clear, however, that he had a definite preference for long-term postings rather than the short-term assignments. The Chairman then invited delegates to express their views on this matter. Without exception delegates stressed that they prefer to have the Associate Director serve under a long-term assignment, recognizing, however, that the short-term assignment may be acceptable for an interim period. They did not favour being dependent on trust fund support. At the same time delegates were unable to nominate a candidate under the existing terms which require his full funding by the nominating country. The delegate of Chile identified financing as the essence of the discussion with other comments irrelevant until this is resolved.

Discussions proceeded on alternatives of funding the Associate Directorship, such as regarding the post as for training and seeking TEMA support. The Secretary pointed out that this again would only be possible through contributions to the IOC Trust Fund.

An option was considered of having either the Director or Associate Director of ITIC receive full Unesco status. The Secretary outlined that this proposal might be taken into account when preparing the 1984/85 budget.

Such an arrangement will open the post to all Member States of the Commission and of Unesco.

The ad hoc Group presented as an alternative the funding of an Associate Directorship by assessment among all Member States of ITSU. By such procedure the country of the appointee will continue to pay salary and normal supplementary benefits, while other costs would be shared from the assessment funds. Member States were questioned as to the reaction they expected their country will give to such a proposal and their responses were divided.

Through a motion by the delegate of the USA, the Group agreed that it had no real solution to the problem, other than retaining the present arrangement.

If no Associate Director is nominated from the Member States, possibilities of some relief may come by staffing the position through extra-budgetary project as discussed under Agenda item 8. The Group adopted Recommendation 1 on this Agenda item.

7. *Consideration of Recommendations from the IUGG Tsunami Committee Meeting held in Canberra, Australia, December 1979*

A summary of the results of the IUGG Tsunami Committee Meeting, held in Canberra, Australia, in December 1979 was presented by the Director ITIC. A full description of the meeting is contained in his report to the Session and also in the January 1980 issue of the Tsunami Newsletter. The Group expressed the concern that, in some respect, the co-ordination between the IUGG Committee and ITSU had been lacking. To correct this situation, it was suggested that the Commission and ITSU hold its meetings in conjunction whenever possible, as had been done on previous occasions. The Group noted that IUGG had recommended the formation of National Committees. These Committees would certainly provide an opportunity for co-ordination on the national level between the Committees and ITSU National Contacts, and such co-operation is urgent. Further, the Group felt that ITSU would benefit if delegations to its meetings were to include tsunami researchers. These researchers may appropriately be sought from the IUGG National Tsunami Committees. In view of the above, the Chairman was requested to convey the Group's concern and need for co-operation between the two bodies to the Chairman of the IUGG Commission and to suggest that future meetings be arranged in conjunction. The Secretary was also to take this into consideration when arranging future sessions of ITSU.

Finally, the Group wishes to express its thanks to Dr. Soloviev, retiring Chairman of the IUGG Tsunami Committee, for his continued efforts to keep close working relationships with the ICG/ITSU on research. The Chairman was requested to convey this expression of thanks to Dr. Soloviev on behalf of the Group.

8. *Proposals for further expansion of the Tsunami Warning System in the Pacific (TWS)*

a) *Tide and seismic stations*

b) *Regional warning centres*

The Director ITIC reviewed from his report to ITSU sections dealing with existing tide and seismic station systems and proposed to increase the number of stations. Some have been added by recent increases in ITSU membership and others through recent liaison visits.

Primary needs for additional stations lay in the South Pacific, where for lack of prompt information, warnings presently cannot be given in less than 2 hours.

Queried about tide stations being operated in the islands of the South Pacific by the University of Hawaii, he stated that with one or two exceptions these stations duplicate gauges already in the system.

A request was made by the US delegate for ITIC to produce additional travel time charts for tide stations entering the Tsunami Warning System. This was objected to by the Canadian delegate as being outside the scope and responsibility of ITIC, according to its mandate and functions. Since the resources of ITIC are very limited, it is essential that its work be directed to its primary responsibilities of information, liaison, research support and monitoring the Tsunami Warning System on behalf of Member States.

The representative of the USA outlined a proposal for a revision in the procedures for the dissemination of watches and warnings. The revision concerns warning selected areas rather than the entire Pacific, unless it is necessary. At present, watch messages are generated for those earthquakes of magnitude 7.5 or greater in the Pacific area and 7.0 or greater in the Aleutian area. When a watch is initiated, tide stations in the immediate vicinity of the epicentre have already been queried for tsunami data. If a Pacific-wide tsunami has been generated, a warning would be issued. If not, a final watch supplement would be issued thus ending the investigation. This final supplement would again be disseminated to all recipients of tsunami information throughout the Pacific.

The change would be to warn those areas in the vicinity of the epicentre immediately with subsequent areas placed in a watch status thus eliminating the need to disseminate information to the various recipients who are not in immediate danger.

The watch and warning areas would be established by analyzing the relationship among the water wave travel times, Pacific earthquake-generating areas, and the tide gauge locations. The study will also consider problem areas of implementation such as communications feasibility; education of the new watch and warning procedures for all participants in the tsunami warning system; over-warning; the restructuring of the software for message generation; and the increased workload in generating these messages by the Pacific Tsunami Warning Center staff.

The Group decided to form a Task Team, consisting of Fiji, Chile, France and USA, to prepare a plan and implementation programme for the modification of procedures for the issuance of tsunami watches and warnings. The Task Team will submit this plan to the Member States in approximately nine months and it is expected that a test of the new procedures will be carried out by PTWC in 1981. Resolution 1 was adopted accordingly.

9. *Proposals for further technical improvements of the Tsunami Warning System in the Pacific*

   a) *Rapid data and watch and warning dissemination*

   b) *Implementation of satellite telemetry system*

The Delegate of Chile presented a major proposal for extending and automating its seismic network, with the addition of 25 seismic stations. Further discussions followed on the technical aspects of the Chilean earthquake proposal. In discussions it was agreed to be a very ambitious programme, involving not only the seismic centres, but also the microwave, radio and land line link for communication. A question was raised whether tide gauge data transmission would be incorporated and the delegate from Chile pointed out that the tidal measurements were a separate responsibility. Present tidal coverage is not all that is desired, but it is being improved gradually and sites are being planned. Discussion then focused on seeking extrabudgetary funds for technological improvement of the Tsunami Warning System. The Chairman pointed out that although progress has been made over the past ten years, we are only now approaching the stage where the Pacific Tsunami Warning Center can interrogate some tide and seismic stations in near-real time. Only with such facility can we provide necessary warnings. The Secretary advised of the prospect of funding through one of the United Nations agencies and it was recognized that such funds could upgrade and automate the existing system only, but would not be adequate for developing regional networks. By consensus it was decided to proceed in two stages, upgrading the present system now and soliciting funds to develop regional centres at a later date (Recommendation 2 and its appendix (see Annex VI), which was endorsed by the Group, refer).

The delegate of Ecuador suggested that as an immediate stage, a telex system could be established from the Galapagos Islands to Ecuador. The Director ITIC concurred with the need for response from these Islands and suggested that the United States consider installing a telex receiver at the Pacific Tsunami Warning Center.

The delegate of Fiji spoke on the need of a regional communication network so that within the Islands of the South West Pacific each could be advised quickly about locally generated tsunamis.

The Group identified the need to develop a plan for regional warning centres. The ad hoc Group chaired by the Director ITIC was requested to prepare a first proposal. The Member States wishing to participate in this work are: Chile, Ecuador, Indonesia, Peru and Canada. The Director ITIC agreed to co-ordinate this work. Resolution 2 was adopted accordingly.

10. Tsunami Warning System Operations

The Director ITIC reported that in the past 2 years the Pacific Tsunami Warning Center had felt 51 events. Some changes have come about on system automating included with many computer installations at Alaska and Hawaii. The first satellite transmitting tide stations and seismic stations are in operation and others will be established in 1980.

11. World Data Center A-Tsunami

The delegate of USA drew the attention of the participants to the ICSU Guide to International Data Exchange and circulated a revised list of tide stations for which tsunami data are requested.

Member States are encouraged to co-operate in systematic tsunami data submission. The Secretary is requested to circulate the list to all IOC Member States, asking for updating. The updated list will then be transmitted to ICSU for inclusion in the Guide.

12. Proposals for research on tsunamis

The Director ITIC provided a summary of tsunami research activities discussed at the recent Pacific Scientific Congress, the tsunami symposium of IUGG at Canberra and of a workshop funded by the National Science Foundation. He made reference to a variety of research activities proposed in his report to the Group. In view of the Group's concern with operational problems, two related proposals were considered. The most urgent, a study of tsunami-risk estimation in highly populated areas and ITIC's historical study on tsunamis. Recommendation 3 was adopted on this subject.

13. Proposals for a tsunami educational programme

The Chairman read from the resolution of the 1978 ITSU Meeting, urging each Member State to undertake a pilot education study. The Director ITIC drew attention to the tsunami warning poster which was sent to all the Member States and also to a list of educational materials received by ITIC, as shown in his report, Annex 12.

In order to make these publications more widely available, the Secretary advised that he may be able to arrange translation of some of these into the official languages of IOC. A number of countries reported on their educational programmes and the delegate of Canada reported on a commercially produced film. He drew attention also to a recent workshop for civic officers, from which educational material may be prepared.

The delegate of Fiji reported that Fiji was running a tsunami educational series in a teacher's magazine, providing source material for use in classrooms. National disaster seminars had been hosted by the National Red Cross and other organizations. Indonesia began translations of pamphlets from ITIC into local languages and asked also that ITIC provide instructional material for Member States.

ITIC conducted a workshop for weather observers from Micronesia, and the programme is included as Annex 13 of the Director's report. Chile has been developing training programmes to provide specialists with the publication on how to react to a variety of disasters. The Education Department is responsible for emergencies and evacuations of schools and instructing students in types of risks to be expected. This training has a multiplier effect, since children are discussing this type of training at home. An amount of approximately US $200,000 was proposed to be included in the programme forecast for 1984/85 to cover the training of specialists on tsunami and of educators as stated in Recommendation 4.

14. Programme Forecast (budget)

The ad hoc Group preparing the 1984-85 budget forecast presented its report.

The Group placed particular emphasis on training of technical specialists and educators.

The Group adopted the budget proposal for 1984-85 with a total of $400,000 of which $120,000 are under Regular Programme. Recommendation 5 was adopted accordingly.

15. Date and Place of the Eighth Session of the International Co-ordination Group for the Tsunami Warning System in the Pacific

The Delegate of Fiji, on behalf of his government, suggested Fiji as the host country of the Eighth Session of the ICG/ITSU, in 1982.

This invitation was accepted with thanks and appreciation.

16. Election of the Chairman and Vice-Chairman

The Secretary read the Guidelines for Subsidiary Bodies of the Commission as adopted by the Eleventh Session of the IOC Assembly. Moved by Fiji and seconded unanimously, the present Chairman, Mr. G. Dohler, of Canada, was re-elected Chairman for one additional term of office. Moved by Chile and seconded unanimously, the present Vice-Chairman, Mr. C. Vargas, of Peru, was re-elected Vice-Chairman for one additional term of office.

17. Adoption of the Summary Report and Recommendations

The Summary Report and the resolutions and recommendations (Annex II to the Report) were adopted.

18. Closure of the Session

The Session was declared closed by the Chairman on 7 March 1980 at 17.00.

ANNEX II

RESOLUTIONS AND RECOMMENDATIONS ADOPTED BY THE INTERNATIONAL CO-ORDINATION GROUP FOR THE TSUNAMI WARNING SYSTEM IN THE PACIFIC AT ITS SEVENTH SESSION

RESOLUTION ITSU-VII.1

ITSU TASK TEAM ON A STUDY OF TSUNAMI WATCH AND WARNING PROCEDURES

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Being concerned that the present Pacific-wide Warning System is not meeting the needs of Member States in regard to local tsunamis,

Having considered a proposal by the USA to revise the procedures for the issuance of tsunami watches and warnings in a more timely manner,

Decides to establish an ITSU Task Team on a Study of Tsunami Watch and Warning Procedures, having the terms of reference appended to this resolution, to develop a plan for the improvement of procedures for issuing tsunami watches and warnings.

ANNEX TO RESOLUTION ITSU-VII.1

Terms of Reference for the ITSU Task Team on a Study of Tsunami Watch and Warning Procedures

Members: Chile, Fiji, France and USA.

The Task Team will:

- *Devise a scheme for the issuance of tsunami watch and warning messages on a selected area basis;*
- *Assess the impact of changes on the operation of the Pacific Tsunami Warning Center (PTWC);*
- *Assess the impact of changes on national warning procedures;*
- *Organize a test of the recommended procedures.*

Work Schedule

January 1981 - Study and recommendations submitted to Member States of ITSU for comment.

July-December 1981 - Operational test of recommended procedures.

April-June 1982 - Final report and recommendations submitted to ITSU-VIII

RESOLUTION ITSU-VII.2

ESTABLISHMENT OF A TASK TEAM ON REGIONAL TSUNAMI WARNING CENTRES

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Noting the interest expressed by Member States in the establishment of regional tsunami warning centres for the mitigation of the effects of locally generated tsunamis,

Instructs the Director ITIC, in close co-operation with authorities in Canada, Chile, Ecuador, Indonesia and Peru, to examine the feasibility of establishing regional tsunami warning centres in critical areas of the Pacific, and to explore the possibility of international funding for that purpose.

RECOMMENDATION ITSU-VII.1

ASSOCIATE DIRECTOR ITIC

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Recognizing that continuity in the staffing of the post of Associate Director ITIC is essential to fulfillment of duties and responsibilities set forth in the "Mandate and Functions of ITIC,"

Recognizing further that since June 1979 no Member State has been able to nominate a candidate and pay all his expenses if selected,

Stressing that voluntary contributions through the IOC Trust Fund, as requested at previous ITSU meetings, are necessary to subsidize a posting,

Recommends that Member States continue to make an effort to second an Associate Director to ITIC, taking into account the fact that the full salary for the incumbent has to be paid by the seconding country; and

Recommends further that Member States be urged to contribute to the IOC Trust Fund, to cover the post adjustment and travel costs of the incumbent.

RECOMMENDATION ITSU-VII.2

EXTRABUDGETARY FUNDING

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Recognizing that the coastal population and industries in the developing countries of the Pacific are threatened by tsunamis and that the Tsunami

Warning System, as it exists presently, is still unable to issue warnings to many places within two hours of the originating event.

Recognizing further that the socio-economic development of Pacific countries is closely related to the mitigation of the effects of natural disasters such as tsunamis, and that expedient relief could be brought about through the establishment of regional tsunami warning centres and through intensified public education and preparedness,

Recommends that developing ITSU Member States should apply for extra-budgetary funds such as UNDP funds or the International Fund for Science and Technology to support:

- *The establishment of a denser network of automated tide gauges around the Pacific;*
- *Communication and telemetry links between seismic and tide gauges, the Pacific Tsunami Warning Center in Honolulu, and existing National Centres;*
- *Training of personnel to handle and maintain the instruments and the communication system;*
- *Maintenance of the system for a period of further two years after its establishment;*
- *A programme of tsunami preparedness;*

Recommends further that the Secretary IOC approach the relevant financing organizations informing them of the urgency of implementing this project(*) because of the continuous threat to life and property in the Pacific Region.

RECOMMENDATION ITSU-VII.3

TSUNAMI RESEARCH

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

In view of the potential for great loss of life in large coastal cities,

Urges the IUGG Tsunami Commission to encourage applied research in studies that will provide information in designated danger areas, specifically the resonance analysis of harbours and the historical study of tsunamis;

Recommends that any tsunami symposia take into account these subjects, including the proposed Tsunami Symposium planned for Ofunato, Japan, in May 1981.

(*) A preliminary proposal is appendixed to this recommendation and contained in Annex VI of the Summary Report.

RECOMMENDATION ITSU-VII.4

TRAINING AND EDUCATION

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Noting with interest that Resolution 33/22 of the United Nations General Assembly requested UNDP to review the possibility of including activities of technical co-operation for preparedness of disasters and for prevention of disasters in UNDP Regional and Inter-Regional programmes,

Recognizing that training of specialists on tsunamis and education of the public in countries threatened by this risk, is of greatest importance for the success of any programme on preparedness for, and prevention of, this kind of disaster,

Recalling Recommendation ITSU-VI.2 on educational material, and

Noting a decision of the IUGG Tsunami Committee to recommend the establishment of national tsunami committees,

Recommends that Member States strengthen their efforts to elaborate, improve and implement Educational Programmes in their respective countries, covering three aspects:

a) Education of the community, beginning with the education of school children and covering the different adult organizations;

b) Training of specialists participating in emergency operations;

c) Dissemination of scientific knowledge to the world scientific community.

Recommends further that these training and education programmes on tsunamis be a permanent and distinct function to be carried out by national tsunami committees, or their equivalents, the establishment of which should receive high priority by Member States.

RECOMMENDATION ITSU-VII.5

PROPOSED PROGRAMME AND BUDGET

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Having reviewed the projected ITSU programme activities and their associated costs for the years 1984 and 1985,

Recommends the ITSU Programme Forecast attached hereto, be accepted by the Commission.

ANNEX TO RECOMMENDATION ITSU-VII.5

Programme Forecast 1984-85	*Regular Programme*	*Trust Fund*
9th Session of ITSU - 1984	*$ 20,000*	-
International Tsunami Information Center Activities - Staff support, Contractual services, Run-up surveys, Printing.	*$ 40,000*	-
Training, Education and Mutual Assistance - Training of technical specialists and educators (approximately $200,000), workshops, printing of educational materials, maintenance of bibliography of training materials, visiting scientists programme.	*$ 45,000*	*$280,000*
Technical Studies related to: Communications, observations, automations, prediction methods, and/or warning centre operations.	*$ 15,000*	-
TOTAL :	*$120,000*	*$280,000*

RECOMMENDATION ITSU-VII.6

POST-TSUNAMI SURVEYS

The International Co-ordination Group for the Tsunami Warning System in the Pacific (ICG/ITSU),

Recognizing the need to document each catastrophic tsunami in order to learn as much as possible about this infrequent but devastating natural phenomenon,

Being aware of the difficulties of arranging surveys of affected areas in a timely manner,

Believing that the carrying out of post-tsunami surveys should be a national function assisted by the ITIC,

Noting that a guide for post-tsunami surveys has been prepared by the ITIC,

Recommends that Member States of ICG/ITSU develop action plans for the conduct of comprehensive and expedient post-tsunami surveys, including the designation of a survey co-ordinator who will work in close co-operation with the Director ITIC;

Recommends further that ITIC provide appropriate training, participate in the surveys when necessary and assist in survey documentation.

ANNEX IV

LIST OF PARTICIPANTS

I. MEMBER STATES

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		Mr. Carlos CROHARE *Dirección Política Especial* *División Antártica y Mar* *Ministerio Relaciones Exteriores* *Palacio de la Moneda* *Santiago* *Phone: 82501 Extension 258*
		General Víctor A. LÓPEZ *Director Oficina Nacional Emergencia* *Ministerio del Interior - ONEMI* *Beauchef 1637* *Santiago* *Phone: 83165 - 61903* *Telex: 40946*
		Coronel Jorge LARRAÑAGA *Sub-Director, Oficina Nacional Emergencia* *(ONEMI-CHILE)* *Beauchef 1637* *Santiago* *Phone: 83165* *Telex: 40946*

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Observer

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CHILE (contd.)	*Observer*	*Mr. Claudio SEGUEL* *Professor Instituto Central de Física* *Universidad de Concepción* *Casilla 947* *Concepción* *Phone: 24985, extension 2257*
	Observer	*Capitán de Fragata Germán VALDIVIA* *Jefe Servicio Meteorológico de la Armada* *Correo Naval, Valparaíso* *Phone: 1071, Quilpué*
	Observer	*Capitán de Navío Víctor VALVERDE* *Jefe del Servicio de Telecommunicaciones de la Armada* *Correo 21, Armada de Chile* *Santiago* *Phone: 725272, extension 229*
	Observer	*Mr. Marco Alberto COMPAGNON* *Ingeniero Civil ENTEL* *Moneda 812 - 4º piso* *Santiago* *Phone: 712121, extension 287* *Telex: 40683 - 40543*
CHINA		*Not represented*
ECUADOR	*Head of Delegation*	*Capitán de Corbeta Galo DÁVILA* *Instituto Oceanográfico de la Armada* *P.O. Box 5940* *Guayaquil* *Phone: 431300*
		Mr. Vicente CORONEL *Geólogo* *Instituto Oceanográfico de la Armada* *P.O. Box 5940* *Guayaquil* *Phone: 431300*
FIJI		*Mr. Rajendra SINGH* *Head of Seismology* *Mineral Resources Department* *Suva* *Phone: 381611* *Telex: 2330 SOPACPRO FJ*

FRANCE		*Mr. Michel RAYMOND* *Consejero Cultural y de Cooperación Científica y Técnica* *Embajada de Francia en Chile* *Condell 65* *Santiago* *Phone: 251030*
GUATEMALA		*Not represented*
INDONESIA	*Head of Delegation*	*First Admiral D.U. MARTOJO* *Chief Hydrographer* *Hydro - Oceanographic Office* *87 Jalan Gunung Sahari* *Jakarta - Pusat* *Phone: 349138* *Mr. SUSANTO* *Chief of Geophysical Division* *Meteorological and Geophysical Institute* *Jalan Arif Rakhman Hakim 3* *Jakarta* *Phone: 375508* *Cable: KLM G - Jakarta* *Mr. Birowo SUJATNO* *Assistant Director* *National Institute of Oceanology* *Lembaga Oceanologi Nasional - LIPI* *Jalan Pasir Putih N°1* *Ancol Timur, Jakarta* *P.O. Box 580 Dak* *Jakarta Utara* *Phone: 683850* *Cable: Lonas Jakarta*
JAPAN		*Not represented*
KOREA (Rep. of)		*Not represented*
MEXICO		*Not represented*
NEW ZEALAND		*Not represented*
PERU	*Head of Delegation*	*Capitán de Navío Alfredo ARNAIZ A.* *Director Accidental de Hidrografía y Navegación de la Marina* *Sáenz Peña N°590* *La Punta - Callao* *Phone: 291974* *Telex: TLX 10143 Armada Lima - Perú*

PERU (contd.)	Vice-Chairman, ICG/ITSU	Capitán de Corbeta César VARGAS FAUCHEUX Jefe, Departamento Oceanografía Dirección de Hidrografía y Navegación de la Marina Sáenz Peña N°590 La Punta, Callao Phone: 296304 Telex: TLX 20143 Armada, Lima-Perú Teniente Primero Julio BEHR L. Dirección de Hidrografía y Navegación de la Marina Sáenz Peña N°590 La Punta, Callao Phone: 296304 Telex: TLX 20143 Armada, Lima-Perú
PHILIPPINES		Not represented
SINGAPORE		Not represented
THAILAND		Not represented
U.K. (HONG KONG)		Not represented
UNION OF SOVIET SOCIALIST REPUBLICS		Not represented
UNITED STATES OF AMERICA	Head of Delegation	Mr. Bertrand THOMPSON Chief, Oceanographic Service Branch National Weather Service (W.G.) Gramax Bldg., Room 1213 8060 13th Street Silver Spring, MD 20910 Phone: (301) 4277278 Mr. Thomas SOKOLOWSKI Principal Geophysicist Pacific Tsunami Warning Center 91-270 Fort Weaver Rd. Ewa Beach, Oahu, Hawaii 96706 Phone: (808) 6898207
WESTERN SAMOA		Not represented

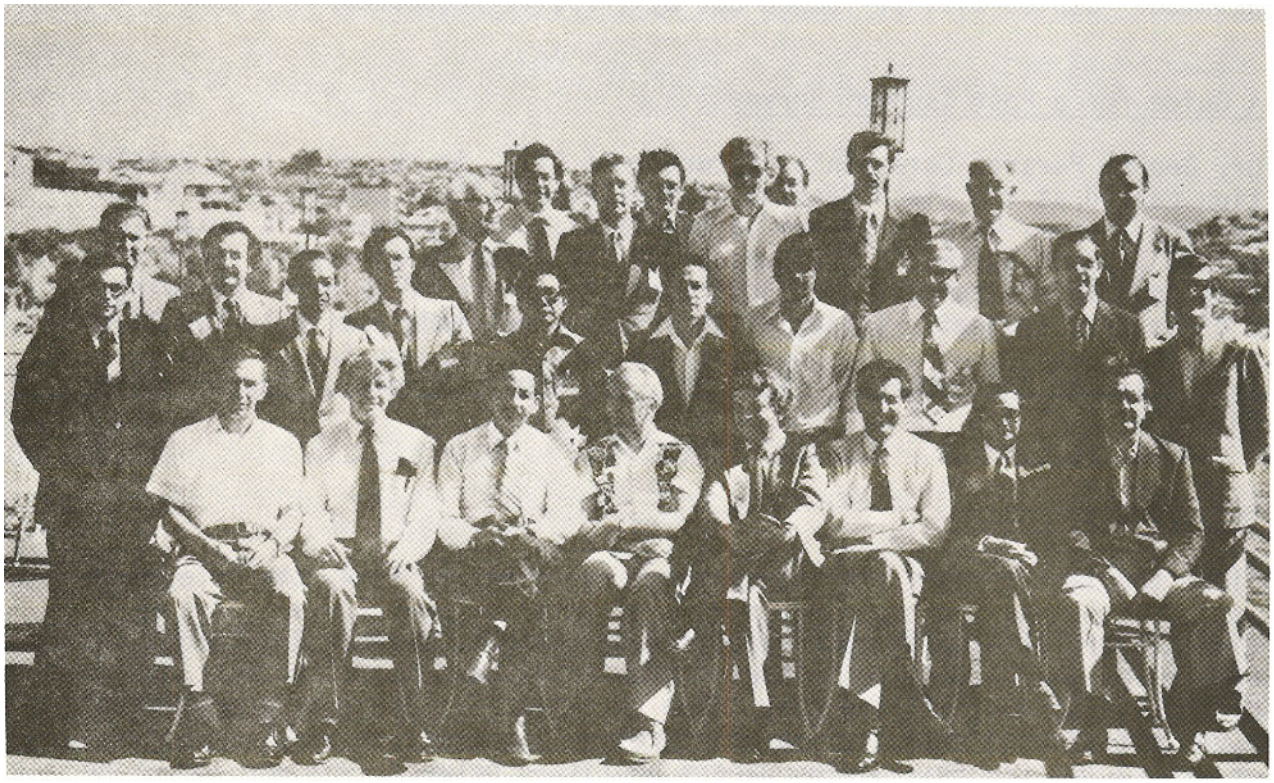
II. ORGANIZATIONS

United Nations Educational, Scientific and Cultural Organization (Unesco)	Dr. Günter GIERMANN Deputy Secretary Intergovernmental Oceanographic Commission Unesco 7 Place de Fontenoy 75700 Paris, France Phone: National (1) 5771510 Telex: 204461 Paris
World Meteorological Organization (WMO)	Comandante de Grupo Federico ROLL-FUENZALIDA Organización Meteorológica Mundial Dirección Meteorológica de Chile Casilla 717 Santiago Phone: 90754 Cable: METEOCHILE

III. SECRETARIAT

Intergovernmental Oceanographic Commission (IOC)	Dr. Günter GIERMANN Deputy Secretary Intergovernmental Oceanographic Commission Unesco 7 Place de Fontenoy 75700 Paris, France Phone: National (1) 5771610 Telex: 204461 Paris
International Tsunami Information Center (ITIC)	Dr. George PARARAS-CARAYANNIS Director, International Tsunami Information Center P.O. Box 50027 Honolulu, Hawaii 96850, USA Phone: (808) 5462847, 5462848 Cable: ITIC, Honolulu

Dr. George Pararas-Carayannis, Director, International Tsunami Information Center at meeting in Vina del Mar, Chile.



Participants to the VII Session of the International Coordination Group for the Tsunami Warning System in the Pacific, in Vina Del Mar, Chile, March 3-8, 1980.

INTERNATIONAL TSUNAMI INFORMATION CENTER - HONOLULU

ITIC Associate Directorship

The position of Associate Director of the International Tsunami Information Center was established in 1974 by Recommendation EC-IV.6, to be filled from a Member State of the International Coordination Group for the Tsunami Warning System in the Pacific other than the United States. Salary and cost of living allowance for the incumbent has to be covered by his Government. The former Associate Director left ITIC at the end of June 1979 and since then, the position has been vacant. Member States are urged to submit names of suitable candidates for the position to ITIC at their earliest convenience.

Biannual Report of ITIC 1978-1980

Dr. George Pararas-Carayannis, Director of ITIC, has prepared a comprehensive biannual report of the work of the Center as it relates to ITSU and the Pacific Tsunami Warning System. This report was presented at the VII Session of the International Coordination Group for the Pacific Tsunami Warning System (ITSU), in Vina Del Mar, Chile in March of this year, and was distributed to all national contacts of ICG/ITSU Member States. Because of the size of this report only a limited number of copies were printed. Copies will be loaned out by ITIC, if requested.

A Guide for a Post Tsunami Survey

Dr. George Pararas-Carayannis, Director of ITIC, in response to a resolution passed at the Sixth Session of the International Coordination Group for the Tsunami Warning System in the Pacific, has prepared "A Guide for a Post Tsunami Survey." The purpose of the Guide is to assist field personnel in the conduct of a comprehensive survey of an area following a disastrous tsunami. Copies of the report were made available to all national contacts of ICG/ITSU member countries. For copies of this report write to the Director, ITIC, P.O. Box 50027, Honolulu, Hawaii 96850, USA.

Tsunami Bibliography

Since the last tsunami bibliography was published in 1964, the literature in the field has increased greatly. The International Tsunami Information Center (ITIC) with some support from the U.S. Nuclear Regulatory Commission (NRC), compiled in handwritten index card form, the most comprehensive tsunami bibliography known to exist. It contains approximately 3,000 citations of all English and foreign language (with English titles or abstracts) tsunami-related papers published between 1962 and 1976. An additional effort is being made by ITIC to update this listing.

Since the modest funding provided for the project was exhausted during the data collection phase, ITIC turned over to NRC the card bibliography requesting assistance in organizing this bibliography into an appropriate format compatible with computer and word processing equipment. NRC has assigned this task to its Division of Technical Information and Document Control (TIDC). Final editing will be done by ITIC and NRC will arrange for publication in the near future.

Historical Tsunami Study on the Samoan Islands Conducted

ITIC has just completed a preliminary report on historical tsunamis in the Samoan Islands. The study was carried out under a contract with the U.S. Army Corps of Engineers, Waterways Experiment Station (WES), for the purpose of verifying with historical data, a numerical study of tsunami runup in the islands performed by WES.

Information in the ITIC report has been compiled from historical and newspaper accounts, archival and manuscript materials, tsunami catalogs, and mareographic records. Detailed narrative descriptions of each event are given in chronological order and followed by a catalog listing.

Indonesian Scientist Visits ITIC

Mr. Sulaiman Ismail, Head of the Sub-Division Seismo Teleseismic of the Center for Meteorology and Geophysics in Indonesia is presently on a 6-week training visit to ITIC under UNESCO-IOC sponsorship and support. Mr. Ismail is familiarizing himself with the Pacific Tsunami Warning System and with the operational techniques being used for tsunami monitoring and evaluation, as well as with disaster preparedness. The experience gained by Mr. Ismail during his visit will be extremely helpful in assisting with the establishment of a regional tsunami warning system, when he returns to Indonesia. Indonesia has experienced a number of destructive tsunamis in the last few years.

Director ITIC Meets with Soviet Scientists

Or. George Pararas-Carayannis, Director of ITIC met with Soviet Scientists, Dr. Ari Zhukov and Or. Zhenya Kulikov during their recent visit in Honolulu. The Soviet Scientists are both from the Sackhalin Institute and were in Honolulu on a Tsunami Project sponsored jointly by US/USSR under an Environmental Protection agreement. During their visit in Hawaii, the Russian scientists worked closely with U.S. scientists at the Joint Institute for Marine and Atmospheric Research (JIMAR), a U.S. research center supported by U.S. National Oceanic and Atmospheric Administration (NOAA) and the University of Hawaii.

EDITORIAL AND LETTERS

Command Post Exercise on the Canadian West Coast

The following was received from the British Columbia Earthquake and Tsunami Working Group:

"On March 27, the British Columbia Earthquake and Tsunami Working Group held a command post exercise to test tsunami warning procedures on the Canadian West Coast. Officers of various departments who would be involved in a tsunami watch and in coastal evacuation met to create a tsunami alert situation.

A simulated message from Pacific Tsunami Warning Center of an earthquake south of Attu in the Aleutians commenced the operation. Procedures for disseminating and acting on this and subsequent messages were reviewed.

The next message simulated advised of a 1.2 metre initial wave, reported by the Adak tide station. Attempts to evaluate the significance of this wave report brought into focus the lack of information needed for making a decision on coastal evacuation. Presently we do not know how responsive the gauging stations in the Warning System are to a tsunami from any particular source, or how the stations are shielded by coastal features. We have no systematic historical knowledge of how these gauges have responded to past tsunamis, or how the size of the first wave relates to the maximum that may be expected.

Although the exercise concluded with a decision that a coastal evacuation should be undertaken in the given case, the need to have historical studies made and basic information available was clearly evident.

We realize that much can be learned from such an exercise and intend to repeat it as soon as possible."

ITIC would like to encourage any agencies or stations who have held any exercise of this sort to write to the ITIC Newsletter Editorial so that the experience gained can be shared with others.

NATIONAL AND AREA REPORTS

Tsunami Station Inspection

Mr. Mickey Moss, Lt. Kathy Andreen and Lt(JG) Marianne Molchan of the Pacific Tide Party of NOAA completed the following inspection and maintenance of tide stations of the Pacific Tsunami Warning System in the first quarter of 1980.

January 19 & February 19-21	Honolulu, Hawaii
February 4-6	Hilo, Hawaii
February 10-12	Midway Island
February 11-14	Johnston Island
February 13	Nawiliwili, Hawaii
February 13	Wake Island
February 14-21	Kwajalein Island
February 23-26	Truk Atoll
February 25	Honuapo, Hawaii
February 25	Kailua - Kona, Hawaii
March 5-8	Malakal, Palau
March 6	Apia, Western Samoa
March 9-11	Okinawa, Japan

The excellent work of the Pacific Tide Party in maintaining a number of tsunami stations is greatly enhancing the capability of the Pacific Tsunami Warning System to monitor tsunami activity in the Pacific. The contribution of NOAA's Pacific Tide Party is appreciated by all the Member States that benefit from an upgraded Tsunami Warning System.

Tsunami Symposium Held in Japan, April 1980

A one-day symposium entitled "Considerations on the Tokai and Nankai Earthquakes and Tsunamis" was held at Tokai University, Tokyo on April 5, 1980. The convener and the chairman were Dr. H. Miyoshi and Dr. Y. Nagata, respectively, and six themes were presented. The contents of the lectures dealt with the following subjects:

Dr. Kumiji Iida: "On the Tokai and Nankai Earthquakes"

Dr. Iida introduced in detail many of the big earthquakes which had affected the southern coast of the central part of Japan. There were many earthquakes which occurred in pairs. The oldest pair or earthquakes were that of December 17, 1096 which affected the Tokai districts and that of February 22, 1099 which affected the Nankai districts. The interval between them was only 2.18 years. The other intervals were 0.7 year, zero hour, 1-2 hours, 31 hours and 2.04 years, respectively. The need was emphasized to study also earthquakes which did not form pairs.

Dr. Isamu Aida: "Simulations of the tsunamis based upon the dislocation models"

Dr. Aida calculated the wave heights at many places by a simulation of the tsunami of December 23, 1854, based upon Ishibashi's dislocation model (1976), using the small grids, the smallest of which were of 312.5m. The results were compared with historically known tsunami runup measurements. The ratios of the actual wave heights to the calculated ones was from 0.8 to 1.2. It was suggested that simulations can supply information such as current velocities which the ancient manuscripts do not provide.

Dr. Tokutaro Hatori: "Examination of the wave heights of the tsunamis of October 28, 1707 and December 23-24, 1854, as observed along the southern coast of the central part of Japan"

Dr. Hatori suggested that these tsunamis were much bigger than those of 1944 and 1946, judging from many old monuments and ancient manuscripts. He suggested that the periods of these tsunamis were also longer. He inferred that the bottom had deformed fast in 1707 and 1854, and emphasized that the earthquakes and tsunamis of 1707, 1854 and 1944-1946 had not been recurring events.

Mr. Yoshinobu Tsuji: "The data of the earthquake and the tsunami of September 20, 1498"

Mr. Tsuji said that this earthquake was the biggest among the similar ones which attacked the central part of Japan repeatedly. He recognized, however, that this tsunami was inaccurately reported as killing 26,000 people in Shizuoka Pref. The true figure might be 260. The Chinese characters of 260 in the running style resemble those of 26,000. He also introduced the data of the violent earthquake and tsunami in Wakayama, near to Osaka, suggesting the regularily of recurrence of such earthquakes.

Dr. Hisashi Miyoshi: "The sea walls on the sand etc."

Dr. Miyoshi emphasized the danger of building sea walls on sand. It is believed that the southern coast of the central part of Japan is now threatened by an impending large earthquake, and that this district is one of those where sand exists most abundantly.

A short note was added that, on July 18, 1979, there occurred a TANAH LONGSOR (LAND FALL) on Lomblen Island, Indonesia. A violent tsunami attacked Lomblen Island and killed about 700 people.

Mr. Iwao Morikai (presented by H. Miyoshi):

An 8-mm color movie of the Chilean Tsunami of May 24, 1960 by Mr. I. Morikai, Hachinohe City, Japan, was presented for the young members of the Oceanographical Society of Japan. The color movie can well express the raven-black turbid waters.

ANNOUNCEMENTS

Proceedings of Tsunami Workshop Completed

Under the sponsorship of the National Science Foundation, a tsunami workshop, organized by Tetra Tech, Inc., was held last year at the Coto de Caza, Trabuco Canyon, Southern California from 7th to 9th of May. The purpose of the workshop was to provide a forum for a critical review of the status of tsunami research. The workshop was divided into a number of sessions with presentations of selected topics by chairmen of workshop sessions followed by further discussions of workshop participants. The proceedings of this National Science Foundation Workshop, organized and edited by Dr. Li-San Hwang and Dr. Y. Keen Lee, of Tetra Tech, Inc., were prepared and have been published in the hope that the findings and deliberations in the workshop will reach a wider community of interested parties.

Tsunami Brochure Printed in Chile

General Victor Aquiles Lopez Barrenechea, Director of the National Emergency Office of the Republic of Chile has informed ITIC that a brief brochure on tsunamis has been prepared by his office for distribution to all agencies and organizations in Chile dealing with the Tsunami Warning System. The informative brochure in Spanish contains also recommendations to the coastal population on what to do in case of a local earthquake and tsunami. Sample copies of the brochure have been sent to ITIC and can be reproduced, if requested.

Seventh World Conference on Earthquake Engineering - The Turkish National Committee on Earthquake Engineering. Istanbul, Turkey: September 8-13, 1980

The Conference will bring together individuals from the fields of earth science, engineering, architecture, urban planning social science, administration and insurance to encourage the exchange of ideas and information, and to motivate cooperation among those involved in research, application and implementation of earthquake engineering. Deadline for registration was June 30, 1980. Information is available from *Organizing Committee, World Conference on Earthquake Engineering, Deprem Arastirma Enstitüsü, Yüksel Caddesi, 7/B, Ankara, Turkey.*

U.S.-Japan Cooperative Earthquake Research

The Division of Problem-Focused Research (PFR) of the National Science Foundation's Directorate for Engineering and Applied Science (EAS) plans to provide approximately $3.0 million over a five-year period to support laboratory experimental research on building structures by U.S. and Japanese co-investigators using facilities in the U.S. and in Japan. The program will provide funds for salary, equipment, material and travel for the participating U.S. scientists; support for Japanese participation

is provided by Japanese sources through the Ministry of Construction and the Science Technology Agency in Japan.

Unsolicited proposals may be submitted by colleges, universities, industry and other organizations or firms, whether operating for profit or on a not-for-profit basis. Support for FY 1980 to 1981 will be limited to research on reinforced concrete structures. Support for FY 1982 to 1984 will deal with structural steel, precast/prestressed concrete, mixed steel/reinforced concrete, masonry and timber. The U.S. and Japanese proposals should be fully coordinated prior to submission and must be of clear benefit to both countries.

Detailed guidelines for submission are available from *Dr. S. C. Liu, PFR-EAS, National Science Foundation, Washington, Washington, DC 20550, (202) 632-5700.*

Earthquake Prediction Council

The establishment of the National Earthquake Prediction Evaluation Council was announced on January 28, 1980. To be composed of not fewer than eight federal and non-federal earth scientists, the Council will review data collected by other scientists and recommend to the USGS director whether a formal earthquake prediction or advisory is warranted. Organization of the Council implements the provisions of the Earthquake Hazards Reduction Act of September, 1977, and of a plan developed by a White House working group. As part of its role, the Council may also consider the questions of how to release predictions and warnings in such a way as to maximize constructive response by state and local officials.

Clarence Allen, of the California Institute of Technology, has been named Chairman; Robert Wesson, chief of the USGS Office of Earthquake Studies, will serve as Vice-chairman. USGS members are David P. Hill, C. Barry Raleigh, James C. Savage, and Robert E. Wallace, all at Menlo Park, and Eric R. Engdahl of Denver. Neil Frank of the National Hurricane Center, NOAA, is also a member. Non-federal members are Keiiti Aki, MIT; T. Neil Davis, University of Alaska; Thomas V. McEvilly, University of California; and Lynn R. Sykes, Columbia University.

Funding and Volunteer Support for Field Research

Interested scholars in need of funds and volunteer support for their 1981 field research should contact The Center for Field Research. This private, non-profit organization and its affiliate, EARTHWATCH, arrange support for 70 research projects each year through the field assistance and financial contributions of interested volunteers.

Proposals are reviewed on the basis of scholarly merit and the project's need for teams of volunteers in the field. There are no limits on geographic location, and proposals in any recognized academic discipline are considered.

The Center invites proposals from post-doctoral scholars of any nationality, and actively encourages women and minority investigators to apply. Upon favorable review of a preliminary proposal, a full proposal will be invited for the May 15 deadline (for work taking place December-June) or the October 1 deadline (for work taking place June-December).

If you are planning field research in 1981, write for more information, or send a two-page preliminary proposal outlining your objectives, dates, and funding and volunteer needs to: *Nancy Scott, Research Coordinator, Center for Field Research, Box 127-i, 10 Juniper Road, Belmont, MA 02178 U.S.A.*

Joint Oceanographic Assembly

The next Joint Oceanographic Assembly will be held at Dalhousie University in Halifax, Canada, August 2-13, 1982.

The scientific program will consist of General Symposia of invited papers on selected topics in marine science, Special Symposia of invited papers on selected specialized subjects, and Association Sessions. A second circular will be issued in late 1980 containing a general outline of the scientific program, local arrangements, and a preliminary registration form. All correspondence relating to the Assembly should be addressed to: *Mr. Leo O'Quinn, Executive Secretary, JOA-82, 240 Sparks Street, 7th Floor West, Ottawa, Ontario K1A OE6 Canada.*

International Tsunami Symposium 1981
Sendai-Ofunato, Japan, 25-29 May 1981

The Symposium: During the last General Assembly of the International Union of Geodesy and Geophysics held at Canberra, Australia in December 1979, the Tsunami Commission of IUGG decided to hold its next international symposium on tsunami research in Japan.

The International Tsunami Symposium 1981 will be convened by the Tsunami Commission of IUGG. The Japanese Organizing Committee of the Symposium invites all scientists and engineers who have an interest in tsunami research to participate in the Symposium which will take place in Sendai and Ofunato, Japan, 25-29 May 1981.

The Symposium is endorsed by the Oceanographic Society of Japan, the Seismological Society of Japan, and the Japan Society of Civil Engineers.

Objects of the Symposium: The principal objective of the Symposium is to being together from all over the world scientists and engineers specializing in the field of tsunami research to exchange information on technical advances and to discuss progress in the science.

Symposium Subjects: Original papers, well organized review papers, or well documented case studies on all aspects of the tsunami problem; scientific, engineering, and socio-economic are called for:

Tsunami Source and Earthquake

Hydrodynamics related to Tsunami

Tsunami Effects and Mitigation of Tsunami Hazards

Instrumentation, Warning System, Socio-economic Effects

Symposium Programme: Technical field trip to the Sanriku coast well known for its long and eventful tsunami history will form a part to the Symposium Programme in addition to the presentation of papers and discussions.

Ofunato is the town most severely damaged in Japan by the Chilean Tsunami of 1960, about 20 years ago. It is hoped that participants will take the opportunity of visiting other parts of Japan both before and after the Symposium.

Language: The language of the Symposium will be English.

Papers: Papers must be presented by author/s personally and will not be published in the Proceedings unless presented.

An abstract (not to extend beyond four pages) of each paper proposed for the Symposium should be sent before the end of January, 1981 to either of the following addresses:

Prof. Kumizi Iida, Chairman
IUGG Tsunami Commission
Aichi Institute of Technology
Yakusa-cho, Toyota City
Aichi Prefecture 470-03, Japan

Dr. Harold G. Loomis, Secretary
IUGG Tsunami Commission
Joint Institute for Marine
and Atmospheric Research
2525 Correa Road
Honolulu, Hawaii 96822 U.S.A.

These abstracts will be distributed to participants at the time of registration.

Publication of the Symposium Proceedings: After the Symposium, authors will be asked to provide full versions of their papers, which after reviewing processes will be printed in the Proceedings of the Symposium.

Preliminary Information: Those who hope to attend the Symposium are asked to obtain Preliminary Information Form from the Symposium Secretary at the following address.

Correspondence: All correspondence except copies of abstracts should be addressed to:

Secretariat
Organizing Committee of the
International Tsunami Symposium
c/o Prof. K. Kajiura
Earthquake Research Institute
University of Tokyo
Bunkyo-ku, Tokyo 113, Japan

International Seminar on Seismic Prediction and Evaluation of Seismic Danger - San Juan, Argentina, 20-25 October 1980

Seminario Internacional Sobre Prediccion Sismica y Evaluacion del Peligro Sismico

Objetivos: El propósito del seminario es resumir los progresos alcanzados en la investigación científica en la predicción de terremotos, así como revisar el avance de la investigación y planes de prevencion sísmica con el fin de reducir daños materiales y pérdidas de vidas. En el seminario participarán geofísicos, sismólogos, ingenieros estructurales, arquitectos planificadores, expertos en Defensa Civil, economistas y sociólogos.

Se dará especial atención a la aplicación práctica de la predicción y a los resultados obtenidos en base a las medidas de prevención implementadas.

El resultado del Seminario servirá: A los responsables en los países de la región sudamericana de reducir el riesgo sísmico y las pérdidas de vidas y de bienes materiales, proporcionándoles conocimientos para una mejor planificación y ejecución de las acciones pertinentes a nivel nacional y local. A los científicos, dándoles elementos referenciales para la formulación de programas de investigación a nivel nacional y regional.

Temario: Comprende lo siguiente:

Estado actual de la predicción sísmica

- signos precursores
- métodos
- modelos
- reacción de la población
- rol de instituciones
- análisis económico

Evaluación del peligro sísmico

- sismicidad inducida
- vulnerabilidad
- prevención y medidas para la disminución del riesgo; disposiciones para su cumplimiento

Presentacion de Trabajos: Los autores de los trabajos que se presentarán durante el Seminario deberán proporcionar dos copias del respectivo abstracto, de unas 300 palabras, una a la Secretaría Científica del Comité Organizador y otra a la Dirección de CERESIS, preferible antes del 30 de abril de 1980.

Informacion General: San Juan, capital de la provincia del mismo nombre, se encuentra en el nor-oeste de la Argentina. Tiene una población de 250,000 habitantes. Se llega a San Juan, vía aérea, del extranjero, con transbordo en Buenos Aires o desde Mendoza por vía terrestre.

El clima en octubre es primaveral. La temperatura es variable y suele llegar hasta los 24°C; normalmente no llueve.

El precio de los hoteles es del orden de US$ 20-30 por habitación simple y US$ 35-40 por doble habitación; para la alimentación debe presupuestarse unos US$ 15-20 diarios.

Direcciones: Comite Organizador - Secretaría Científica, Ing. Juan Carlos Castano, INPRES, Roger Balet 67 Norte, San Juan, Argentina, Teléfono: 30600 - 30602, Telex: 59129 INPRE AR. Comite Ejecutivo Local - Presidente Ing. Julio S. Aguirre Ruíz, INPRES (ver arriba).

15th Pacific Science Congress

The President of the 15th Congress, Dr. J.A.R. Miles, advises that the Secretary-General is: Professor C.F.W. Higham, Professor of Anthropology University of Otago, P.O. Box 56, Dunedin, New Zealand.

Professor Higham is in the field of archaeology, having worked mostly in Thailand.

The Congress is in Dunedin, New Zealand, at the University of Otago, with the probable dates in February 1983. Host organization is the Royal Society of New Zealand, established in 1867. Membership of the Royal Society is obtained not directly but through one or other of its affiliated "Member Bodies." In 1979 there were 43 scientific societies affiliated to the Royal Society, the total membership being approximately 15,000.

The Society acts as adhering body to 20 international scientific unions and committees. This operates through appropriate national committees which are appointed by the council of the Society from nominations received from member bodies and fellows.

The Society sponsors international scientific symposia. In 1978-79 there was an international symposium on Membrane Structure and Function, the Asian South Pacific Regional Meeting on Astronomy, the 49th Congress of the Australian and New Zealand Association for the Advancement of Science, and an international symposium on Reproduction in Flowering Plants.

The Society administers the James Cook Fellowship and arranges science information meetings for members of Parliament.

Earthquake Engineering and Hazards Reduction in China

This is a trip report of the American Earthquake Engineering and Hazards Reduction Delegation who visited the People's Republic of Ching during July and August of 1978. Includes materials on Organization of Earthquake Engineering in China; Earthquake Engineering Research and Practice; Report of the Tangshan Earthquake and the Sungpan - Pingwu Earthquakes of August 1976. Copies are available from: *Office of Publications, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.*

ABSTRACTS AND RESUMES

Digitizing of Strong-Motion Earthquake Records by Computer III

Shinobu Yazaki
National Research Center for Disaster Prevention, Japan

Abstract

An automatical SMAC record dizitizing system with a drumscanner and a computer system has been developed in NCRDP.

Efforts have been made especially to shorten the processing time and to improve the accuracy of the digitized values.

With the new system a sheet of record including three components, 25 cm in length, is processed within 10-20 minutes. Several times of trial digitization of a record have revealed that the accuracy of the digitized values is around 0.03 mm in the sense of mean square error.

Catalogue of Tsunamis in the Eastern Mediterranean from Antiquity to Present Times

J. Antonopoulos
Patissia - Athens, Greece

Abstract

This paper presents a systematic compilation of all data pertaining to tsunamis observed or recorded in the Eastern Mediterranean from antiquity to present times (1500 BC to 1980 AD). The first catalogue has been published by Prof. N.N. Ambraseys in the Bulletin of the Seismological Society of America (Vol. 52, No. 4, October 1962) and this has formed the skeleton of this paper. All of the available information has been compiled from historical accounts, newspaper archives, other reports, and recent mareographic data. The earthquake data have been extracted from the Seismological Institute of Athens and relative bibliography. Most of the events listed are associated with earthquakes, but some are the result of volcanic activity. Many of the tsunamis have been generated along the coast of Greece, Albania, South Yugoslavia, Turkey, Syria and Israel. There is little doubt that the large conjugate fault system along the west coast of Greece, Crete and Rodos till the south coast of Turkey is often responsible for the earthquakes in this area and most of tsunamis in the Eastern Mediterranean.

Because of the technical nature and length of this paper, only the abstract is published in the Newsletter at this time.

The Dependence of Tsunami Wave Period on the Source Dimensions

N.R. Mirchina and E.N. Pelinovsky
Institute of Applied Physics
Gorky, USSR

Abstract

The statistical relation of period and length of a tsunami wave in the source to the source dimension is determined. The dependence obtained is not contrary to the piston model of tsunami wave generation.

(Because of the technical nature and length of this paper, only the abstract is published in the Tsunami Newsletter. Copies of the entire paper can be obtained by writing to ITIC or to the authors directly).

Change of Height of the Solitary Wave of Large Amplitude in the Beach Zone

E.N. Pelinovsky and T.G. Talipova
Institute of Applied Physics
Gorky, USSR

Abstract

In this report the change of height of the solitary wave of arbitrary amplitude (but of smaller than the critical one at which a wave breaks) on a slope with a smooth change of depth is calculated on the basis of the energy balance equation. The wave breaking depths and amplitudes at which the breaking occurs are determined. It is shown that for practical calculations the dependence $H \sim h^{-1}$ (H-wave height, h-depth), which is valid for solitons of small amplitude, can be used for other than small heights.

Earthquake Prediction Based on the Seismic Gap with Special Reference to the 1978 Oaxaca, Mexico Earthquake

Masakazu Ohtake
National Research Center for Disaster Prevention, Japan

Abstract

Location and magnitude of the Oaxaca, southern Mexico earthquake of November 29, 1978 were successfully predicted based on intensive studies of the seismic gap phenomenon. The parameters of the Oaxaca earthquake are ϕ=16.072°N, λ=96.487°W for the epicenter location, and M_S=7.8 for the magnitude according to the Preliminary Determination of Epicenters while our estimates were ϕ=16.5°± 0.5°N, λ=96.5°± 0.5° W, and M_S=7 1/2 ± 1/4. The Oaxaca seismic gap, covering a 270 km segment of the seismic belt along the Pacific coast, was initiated in June 1973, and lasted until five months prior to the main shock. The seismic vacancy in the Oaxaca gap was so abnormal that it could have occurred at a probability of only 7.4×10^{-5} by chance.

Although prediction of the time of occurrence was not made, we pointed out that occurrence of the large earthquake would be signaled in advance by a renewal of seismic activity in the seismic gap. Such a premonitory phenomenon was actually observed five months prior to the Oaxaca earthquake.

Research works on seismic gap phenomena so far reported were compiled and statistically analyzed. Main results of the analysis are as follows:

(1) Linear dimension of a seismic gap, L km ranges between length of longer axis of the rupture zone, and ten times the longer axis.

(2) Precursor time, T year of a seismic gap is statistically correlated to magnitude of the main shock, M by
$$\log T = 0.39M - 2.10$$

(3) A high correlation between M and L-T is found as
$$\log(L-T) = 0.64M - 1.63$$

(4) A renewal of seismic activity prior to the main shock is recognized for 35% of the seismic gaps so far reported.

As a result of the detailed case study on the Oaxaca gap and the comprehensive review of the past studies, it was proved that the seismic gap is quite a promising premonitory phenomenon for long term prediction of an earthquake.

Some Discussions on Countermeasures to be done after Issuance of an Earthquake Warning (Fifth Report)

Ichiro Watanabe
National Research Center for Disaster Prevention, Japan

Abstract

Countermeasures to be taken in various organizations after the issuance of each stage of earthquake warning are summarized. The following points are stressed:

(1) It is very important to inform the public of dangerous and safe places and where dangerous materials are located -- that is, seismic microzoning is a basic requirement. This, however, is not an easy task.

(2) Road transportation and subway operation should be suspended or regulated as strictly as possible after the issuance of a warning immediately before an earthquake, although a severe regulation would contradict with countermeasures such as the dispatch of emergency personnel and evacuation procedures. Letting employees return home is not a good countermeasure.

Even if employees are elderly or female, they should be appointed as emergency personnel to undertake light tasks.

(3) The following countermeasures after the issuance of a warning immediately before an earthquake are very effective:

(a) Reducing or stopping operation in factories.

(b) Evacuation from dangerous places.

(c) Moving dangerous materials to safer locations.

(4) It is very important to instruct the public to restrain from doing the following activities after the issuance of a warning immediately before an earthquake:

(a) Telephoning except for emergency calls.

(b) Using cars for evacuation or communication.

(c) Rushing to shops to buy various articles for emergency use.

(d) Rushing to banks to draw money deposits.

The importance of the warning period is emphasized. Many countermeasures could be taken in the warning period with calmness. Calmness in the population is the most effective for preventing panic.

The population density in Tokyo is abnormally high. Almost all of the confusion and panic would result from this high population density. Reducing the population is the most effective countermeasure against earthquake damage in Tokyo.

PACIFIC TSUNAMI WARNING CENTER

Dr. Eddie Bernard Leaves PTWC

Dr. Eddie Bernard, Geophysicist-in-Charge of the Pacific Tsunami Warning Center resigned from the NOAA Corps as of February 22 of this year and accepted a position with the Pacific Marine Environmental Laboratory in Seattle, Washington as the Deputy Director.

Seismic Summary (January 1, 1980 to Press Time)

Event No.	Event	Location	Action Taken
1980-1	Jan 1 1643 (UT) (MS) 6.9	Azores 38.79 N 27.74 W	Press Release
1980-2	Jan 2 2059 (UT) (PTWC) 6.8	Mindanao, Philippines 7.1 N 126.0 E	Press Release
1980-3	Feb 7 1049 (UT) (MS) 6.6	North of MacQuarie Island 54.1 S 159.01 E	-
1980-4	Feb 23 0551 (UT) (PTWC) 7.2	Hokkaido, Japan Region 43.8 N 146.0 E	Press Release
1980-5	Feb 27 2117 (UT) (PTWC) 6.6	Papua New Guinea Region 6.7 S 147.2 E	Press Release
1980-6	Mar 2 2329 (UT) (MS) 6.6	East China Sea 27.01 N 126.61 E	-
1980-7	Mar 8 2212 (UT) (PTWC) 6.8	Vicinity New Caledonia 23.9 S 171.8 E	Press Release
1980-8	Mar 24 0400 (UT) (PTWC) 6.8	Vicinity of Unalaska Island, Alaska 53.3 N 167.7 W	Press Release
1980-9	Apr 13 1804 (UT) (PTWC) 6.6	South of Tonga Islands 24.0 S 177.3 W	-
1980-10	Jun 18 1715 (UT) (PTWC) 6.7	Mindanao, Philippines 10.0 N 127.0 E	Press Release